

CLAIMS

1. An electronic assembly, comprising:
a substrate;
an electronic device having a first, second and third surface,
5 said electronic device supported by said substrate;
a heat pipe having a first and second segment, said first
segment thermally coupled with said first surface of said electronic device;
and
a thermal transient suppression material thermally coupled with
10 said first segment of said heat pipe and at least said second surface of said
electronic device, said material having a component capable of absorbing
thermal energy by phase change from a solid to a liquid and said material
being self contained.
2. The electronic assembly of claim 1, wherein:
15 said thermal transient suppression material includes sufficient
thermal capacity for receiving transient thermal energy produced by said
electronic device; and
said heat pipe includes sufficient thermal capacity for receiving
non-transient thermal energy produced by said electronic device and thermal
20 energy received by said thermal transient suppression material.
3. The electronic assembly of claim 2, further comprising a
heat dissipation device thermally coupled with said second portion of said heat
pipe.
4. The electronic assembly of claim 3, wherein said heat
25 dissipation device comprises a heat sink having cooling fins.
5. The electronic assembly of claim 4, wherein said heat
sink comprises a first case portion.
6. The electronic assembly of claim 5, further comprising
an elastomeric spring compressed between said first case portion and said first
30 segment of said heat pipe, thereby maintaining said first portion of said heat
pipe in thermal contact with said first surface of said electronic device.

7. The electronic assembly of claim 6, wherein said first case portion includes a recess, said recess receiving said elastomeric material.

35 8. The electronic assembly of claim 6, further comprising:
a second case portion, said second case portion being thermally conductive; and

a thermally conductive coupling member thermally coupling said third surface of said electronic device with said second case portion.

40 9. The electronic assembly of claim 8, wherein said first surface and said third surface are located on opposite sides of said electronic device.

10. The electronic assembly of claim 9, wherein said substrate defines an aperture and said thermally conductive coupling member protrudes through said aperture.

45 11. The electronic assembly of claim 8, wherein said first case portion and said second case portion substantially enshroud said substrate and said electronic device therebetween.

50 12. The electronic assembly of claim 11, wherein said first case portion and said second case portion further substantially enshroud said heat pipe.

13. The electronic assembly of claim 2, further comprising a thermally conductive coupling member coupling said first surface of said electronic device and said first segment of said heat pipe.

55 14. The electronic assembly of claim 13, wherein said substrate defines an aperture and wherein said first surface of said device faces said aperture and said thermally conductive coupling member protrudes through said aperture.

60 15. The electronic assembly of claim 2, wherein said first segment of said heat pipe is formed to conform to the shape of said first surface of said electronic device.

16. The electronic assembly of claim 15, wherein said first segment of said heat pipe includes an external flattened portion in contact with said first surface of said electronic device.

65 17. The electronic assembly of claim 2, wherein said heat pipe includes a porous interior layer and liquid which is absorbable by said porous interior layer to provide heat conduction from said first segment to said second segment without requiring a mechanical pump.

70 18. The electronic assembly of claim 2, further comprising at least a second heat pipe thermally coupled with at least one of said first surface and said third surface of said electronic device.

19. The electronic assembly of claim 2, wherein said substrate includes a high current printed circuit board.

20. An electronic assembly, comprising:
a high current circuit board;
75 a first electronic device supported by said circuit board and having a first, second and third surface;
a heat conductive case having a first and second portion adjacent opposite sides of said circuit board; and
a first heat pipe having a first segment thermally coupled with
80 said first surface of said first electronic device and a second segment thermally coupled with said first case portion.

21. The electronic assembly of claim 20, further comprising a thermal transient suppression material in thermal contact with said second surface of said electronic device and said first segment of said first heat pipe.

85 22. The electronic assembly of claim 21, wherein:
said thermal transient suppression material includes sufficient thermal capacity for receiving transient thermal energy produced by said first electronic device; and

90 said first heat pipe includes sufficient thermal capacity for receiving non-transient thermal energy produced by said first electronic device and thermal energy received by said thermal transient suppression material.

23. The electronic assembly of claim 22, wherein said second case portion is in thermal contact with said third surface of said electronic device.

95 24. The electronic assembly of claim 23, wherein said first surface and said second surface are located on opposite sides of said electronic device.

25. The electronic assembly of claim 24, further comprising a thermally conductive coupling member coupled between said second case portion and said third surface of said electronic device, and wherein said circuit board defines an aperture and said coupling member protrudes through said aperture.

26. The electronic assembly of claim 23, further comprising an elastomeric spring compressed between said first segment of said heat pipe and said first case portion.

105 27. The electronic assembly of claim 23, further comprising:
a second electronic device supported by said circuit board; and
a second heat pipe having a first segment and a second segment,
110 said first segment of said second heat pipe thermally coupled with said second electronic device.

28. The electronic assembly of claim 27, wherein said second segment of said second heat pipe is thermally coupled with at least one of said first case portion and said second case portion.

115 29. The electronic assembly of claim 28, wherein said first electronic device and said second electronic device are coupled to opposite sides of said circuit board.

30. The electronic assembly of claim 22, wherein said first electronic device includes electrically conductive leads and said thermal transient suppression material is thermally coupled with said leads.

120 31. The electronic assembly of claim 22, wherein at least one of said first and second case portions comprises cooling fins.

32. The electronic assembly of claim 22, further comprising
at least a second heat pipe coupled with at least one of said first surface and
125 said second surface of said first electronic device.

33. A method of conducting heat away from an electronic device, comprising the steps of:
thermally coupling a heat pipe between the electric device and a
heat sink; and
130 coupling a thermal transient suppression material to the
electronic device and the heat pipe.

34. The method of claim 33, further comprising the
steps of:
mounting the electronic device on a substrate;
135 coupling the substrate to the heat sink; and
providing a compressible material between the heat pipe and the
heat sink adjacent the electronic device.

35. The method of claim 33, further comprising the step of
shaping a portion of the heat pipe to provide improved thermal coupling with
140 the electronic device.